NON-PUBLIC?: N
ACCESSION #: 9405240094
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Browns Ferry Nuclear Plant (BFN) Unit 2 PAGE: 1 OF 8

DOCKET NUMBER: 05000260

TITLE: Unit 2 Scram From Full Power During Planned Maintenance
Activity Due to Inappropriate Personnel Action
EVENT DATE: 04/15/94 LER #: 94-004-00 REPORT DATE: 05/13/94

OTHER FACILITIES INVOLVED: NA DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)
50.73(a)(2)(v)

LICENSEE CONTACT FOR THIS LER:
NAME: Steve Austin, TELEPHONE: (205) 729-2070
Compliance Licensing Engineer

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: BJ COMPONENT: TM MANUFACTURER:
REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On April 15, 1994, at 0219 hours , Unit 2 received a full scram from full power due to a RPS trip signal generated by a low Scram Pilot Air Header pressure signal. This resulted in a low reactor water level which caused isolation of various ESF and RPS system actuation. Plant systems responded as expected with the exception that high temperature alarms were received for the High Pressure Coolant Injection (HPCI) system. Affected ESF and RPS systems were returned to operable status by 0300 hours on April 15, 1994. Operators returned HPCI to service at 0535 hours after no abnormal conditions could be found.

The root cause of this event was inappropriate personnel action during maintenance activity on the Scram Pilot Air Header. The personnel involved deviated from the work order, but did not take the proper

actions to ensure that their actions would not adversely affect plant operation. If the work order had been performed as written the scram would not have occurred.

During the unit scram a false high temperature alarm in the HPCI led to isolation of HPCI. This was attributed to a failed module in the temperature detection loop.

This event is reportable per 10 CFR 50.73(a)(2)(iv) due to the ESF and RPS actuation, and 50.73(a)(2)(v) due to the isolation of the HPCI system, which is a single train system. Corrective actions to prevent recurrence include a review of this event by appropriate personnel and tighter controls for those activities which have the potential for ESF actuation.

END OF ABSTRACT

I. PLANT CONDITIONS

Unit 2 was at 3288 megawatts thermal or 100 percent power. Units 1 and 3 were defueled.

II. DESCRIPTION OF EVENT

A. Event

On April 15, 1994, at 0219 hours, Unit 2 received a full scram from 100 percent power. At the time of this event, valve ISV! manipulations were being performed on the Scram Pilot Air Header LE!. The scram was generated by a Reactor Protection System (RPS) JC! actuation due to a RPS trip signal generated by a low Scram Pilot Air Header pressure signal. The full power scram resulted in a low reactor water level which caused isolation or actuation signals to the following Primary Containment Isolation System JE! (PCIS) systems/components:

o PCIS group 2, Shutdown cooling mode of Residual Heat Removal BO! system; Drywell floor drain isolation valve, Drywell equipment drain sump isolation valve WP!

o PCIS group 3, Reactor Water Cleanup CE!

o PCIS group 6, Primary Containment Purge and Ventilation JM!; Unit 2 Reactor Zone Ventilation VB!; Refuel Zone

Ventilation VA!; Standby Gas Treatment BH!; Control Room Emergency Ventilation VI!

o PCIS group 8, Transverse Incore Probe IG! withdrawal

On April 15, at approximately 0200 hours, maintenance activities were in progress for the Standby Pressure Regulator (2-PIC-085-0067) on the Scram Pilot Air Header (See Figure). The work order for this activity specified that only the header isolation valve (2-085-261) on the inlet side of the pressure regulator needed to be closed to perform this activity. However, as an additional precaution, the operations and maintenance personnel involved in this activity also decided to close the outlet valve (2-085-243). However, the assigned ASOS did not realize that the cross-tie valve (2-085-244) was closed. While closing the outlet valve the ASOS observed a pressure spike on the lead pressure regulator pressure indication (2-PIC-85-0066). The closing of the outlet side valve isolated both the lead primary and standby pressure regulators.

Figure omitted.

As a result, at 0218 hours, the Unit 2 Reactor Operator received a low Scram air header pressure alarm and a half scram on Reactor Protection System "A". The reactor operator then attempted to reset the alarm and contact the ASOS at the pressure regulator. At 0219 hours, the Unit 2 Reactor received a full scram from a Scram Pilot Air Header Low Pressure set point trip. This was followed by a insertion of the control rods, and PCIS group 2, 3, 6, and 8 isolations. At 0220 hours, the main turbine generator TA! tripped.

All systems responded as expected with the exception that operators received a Unit 2 High Pressure Coolant Injection (HPCI) System BJ! area temperature alarm indicating a possible steam leak. Affected systems were returned to operable status by 0300 hours. HPCI was returned to service at 0535 hours after no abnormal conditions or alarms could be found.

This event is reportable in accordance with 10 CFR 50.73(a)(2)(iv), as any event of condition that resulted in manual or automatic actuation of any engineered safety feature including the reactor

protection system. Additionally, due to the isolation of HPCI which is a single train safety system, this event is reportable in accordance with 10 CFR 50.73(a)(2)(v)(A), as any event or condition that alone could have prevented the fulfillment of the safety function of structures of systems that are needed to shutdown the reactor and maintain it in a safe shutdown condition.

B. Inoperable Structures, Components, or Systems that Contributed to the Event:

None.

C. Dates and Approximate Times of Major Occurrences:

April 15, 1994 at 0205 CST ASOS began isolation of the Standby Pressure Regulator.

April 15, 1994 at 0219 CST The unit 2 reactor received a full scram from a Scram Pilot Air Header Low Pressure set point trip

April 15, 1994 at 0227 CST The Unit 2 Reactor Operator received the Unit 2 HPCI area temperature alarm indicating a possible steam leak. HPCI was manually isolated due to suspected steam leak.

April 15, 1994 at 0300 CST The PCIS actuation are reset, SBGT trains are returned to standby readiness.

April 15, 1994 at 0510 CST TVA makes a 4 hour nonemergency notification to NRC in accordance with 10 CFR 50.72 (b)(2)(ii) and 10 CFR 50.72 (b)(2)(iii).

April 15, 1994 at 0535 CST HPCI was realigned to standby readiness.

D. Other Systems or Secondary Function Affected:

None.

E. Method of Discovery:

The Unit 2 Operator received a Scram Pilot Air Header Low Pressure Alarm and a Half Scram In the Unit 2 Main Control Room. These alarms were followed by alarms indicating a full reactor scram had occurred.

F. Operator Actions:

At the onset of the event the Unit 2 Reactor Operator attempted to reset the half scram that occurred when both pressure regulators were isolated. Upon receiving the full reactor scram on low scram pilot header pressure the reactor operator performed the actions described by Abnormal operating Instruction "Reactor Scram," bringing the reactor to hot standby condition. The plant responded as expected with the exception of the HPCI high temperature alarm which required HPCI to be manually isolated.

G. Safety System Responses:

The safety systems listed in Section IIA of this report responded to the reactor scram as designed.

III. CAUSE OF THE EVENT

A. Immediate Cause:

The immediate cause of the reactor scram was the isolation of both the primary and secondary Scram Pilot Header Air Pressure regulators. This isolation resulted in a low pressure condition which actuated the Scram Pilot Header Low Pressure Switches, completing the logic for a full scram of the reactor.

B. Root Cause:

The root cause of this event is inappropriate personnel action. The personnel involved in this event deviated from an approved work order without taking appropriate action to ensure that the resultant valve lineup would not adversely affect plant operation. The work order required only closure of the inlet valve to the pressure regulator. However, as a further precautionary measure, the ASOS decided to isolate the downstream side of the regulator, but failed to communicate this action to the on-shift SOS.

The personnel involved recognized that the cross tie valve (2-085-244) must be open to provide flow to the lead pressure regulator (2-PIC-085-0066), but did not physically verify that the cross tie valve was open prior to closing the outlet isolation valve on the discharge side of the secondary pressure regulator. This action isolated both the primary and secondary pressure regulators on the Scram Pilot Air Header. This action also reduced the pressure to the Scram Pilot Header Low Pressure Switches to below the set point causing the subsequent reactor scram.

Regarding the high temperature alarm for HPCI, TVA's investigation into this event determined that the actual temperature in the area was lower than that indicated by the alarm. Further investigation has revealed that an unexpected failure of a module in the temperature detection loop was the cause of the false high reading.

C. Contributing Factors:

Contributing to this event was a discrepancy between the plant Mechanical Control Diagram and the Flow Diagram utilized by the affected personnel during this event. The Mechanical Control Diagram indicated the normal position of the cross tie valve (2-085-244) to be open. The Flow Diagram depicts the normal position of the cross tie valve as closed. Contrary to Standard Operations Methods, the ASOS performing the valve manipulations utilized the Mechanical Control Diagram when establishing isolation boundaries.

IV. ANALYSIS OF THE EVENT

The design of the scram pilot air header piping requires that the Control Rod Drive AA! (CRD) system fail safe on loss of control air pressure. A low air pressure condition is a condition in which the control rods may randomly drift and the scram discharge volume may fill with water. This random drift could occur when the air pressure an the scram valve actuators is not sufficient to keep the valves seated. When the valves unseat, hydraulic pressure is applied to the hydraulic control unit's piston and the control rod will drift in. The set point of the air header pressure is selected to be low enough to prevent spurious trips, but high enough to prevent unseating of the scram valves. In the event, the RPS

actuation occurred as designed and all systems functioned as expected. Therefore, this event had no safety significance.

V. CORRECTIVE ACTIONS

A. Immediate Corrective Actions:

The affected systems were restored to operable status. Concerning the root cause of the event, appropriate personnel corrective actions were taken regarding the individuals involved in this event.

Concerning the contributing factors in the event, TVA issued Night Orders stating that the Flow Diagrams not the Mechanical Control Diagrams are be utilized for valve alignments. Additionally, the drawing discrepancy that contributed to this event was revised.

The failed HPCI area temperature detection loop module was replaced prior to returning Unit 2 to power operation.

B. Corrective Actions to Prevent Recurrence:

TVA will develop controls which provide additional reviews for maintenance activities which have the potential to cause a reactor scram on the operating unit.

This event will be reviewed by the appropriate Operations, Maintenance, and Technical Support Personnel.

TVA will evaluate the methods and controls for approval and documentation of the manipulation of components outside the prescribed steps of a Work Order.

Though not essential to prevent recurrence of this event, TVA reviewed the Mechanical Control Prints for the CRD and Control Air systems. Other minor discrepancies identified by the review were also corrected. Additionally, TVA selected four other systems and reviewed them for valve position, component sequence/process configuration. The review provided a high degree of confidence that other major discrepancies that could cause a reactor scram are unlikely.

VI. ADDITIONAL INFORMATION

A. Failed Components:

An unexpected failure of a module, Model P11G-1 manufactured by Panagard, in the temperature detection loop for the HPCI area high temperature alarm. This resulted in a higher than actual area temperature indication, requiring that HPCI be isolated during the unit scram.

B. Previous LERs on Similar Events:

LER 260/89028 was issued for an event involving the Scram Pilot Air Header. In this event personnel were installing 2-PI-085-0067A when a solder joint in the same section of the Scram Pilot Air Header failed. This reduced the header pressure to the RPS actuation set point.

TVA reviewed the circumstances surrounding the declaring HPCI inoperable during the unit scram, and found no record of having to declare HPCI inoperable because of a false high area temperature.

VII. Commitments

1. This event will be reviewed by the appropriate Operations, Maintenance and Technical Support Personnel. This review will be completed by July 15, 1994.

2. TVA will develop controls which provide additional reviews for activities which have the potential to cause a reactor scram on the

operating unit. This will be completed by July 15, 1994.

3. TVA will evaluate the methods and controls for approval documentation of the manipulation of components outside the prescribed steps of a Work Order. This evaluation will be completed by July 15, 1994.

Energy Industry Identification System (EIIS) system and component codes are identified in the text with brackets (e.g., XX!).

TVA

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R. D. (Rick) Machon
Vice President, Browns Ferry Nuclear Plant

MAY 13, 1994

U.S. Nuclear Regulatory Commission 10 CFR 50.73
ATTN: Document Control Desk
Washington, D.C 20555

Dear Sir:

BROWNS FERRY NUCLEAR PLANT (BFN) UNITS 1, 2, AND 3 - DOCKET NOS. 50-259, 50-260, AND 296 - FACILITY OPERATING LICENSE DPR-33, 52, AND 68 - LICENSEE EVENT REPORT 50-260/94004

The enclosed report provides details concerning a Unit 2 scram from 100 percent power during a planned maintenance activity on one of the Scram Pilot Air Header pressure regulators. The cause of the event was attributed to inappropriate personnel action when those involved deviated from the work instruction during isolation of the pressure regulator.

As part of the Scram Frequency Reduction Program, TVA has proposed that the Scram Pilot Air Header low pressure scram function be eliminated. To date, a proposed technical specification (TS) change that will remove the scram discharge volume air header scram function has been submitted to NRC. Accordingly, implementation of this TS change will eliminate the risk of a unit scram during this maintenance activity.

Additionally, the report provides details on a manual isolation of the High Pressure Coolant Injection (HPCI) during the unit scram.

This report is submitted in accordance with 10 CFR 50.73(a)(2)(iv), as any event or condition that resulted in manual or automatic actuation of any engineered safety feature including the reactor protection system. Additionally, due to the isolation of HPCI, which is a single train safety system, this event is reportable in accordance with 10 CFR 50.73(a)(2)(v)(A). As any event or condition

that alone could have prevented the fulfillment of the safety function of structures of systems that are needed to shutdown the reactor and maintain it in a safe shutdown condition.

If you have any question or comments please telephone Pedro Salas at (205) 729-2636.

Sincerely,

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